

**Before the
Federal Communications Commission
Washington, D.C. 20554**

In the Matter of)	
)	
Establishment of a Model for Predicting Digital Broadcast Television Field Strength Received at Individual Locations)	ET Docket No. 10-152
)	
)	
Measurement Standards for Digital Television Signals Pursuant to the Satellite Home Viewer Extension and Reauthorization Act of 2004)	ET Docket No. 06-94
)	
)	
Unlicensed Operation in the TV Broadcast Bands)	ET Docket No. 04-186
)	
Additional Spectrum for Unlicensed Devices Below 900 MHz and in the 3 GHz Band)	ET Docket No. 02-380

Comments of Adaptrum, Inc.

Summary

Adaptrum, Inc. applauds the Commission for its initiative in the July 28, 2010 NPRM to adopt an accurate model for predicting DTV coverage. We urge FCC to adopt the type of model proposed and to allow its optional use in the database being implemented for TV band devices pursuant to §15.711(b).

I. Background

In the November 4, 2008 *Second Report and Order and Memorandum Opinion and Order*¹ (2nd R&O) in Docket 04-186 the Commission adopted rules to permit use of secondary TV band devices (TVBDs) in certain VHF and UHF TV channels. As part of an interference prevention strategy, the 2nd R&O required that TVBD must “must access a TV bands database over the Internet to determine the TV channels that are available at

¹ *Second Report and Order and Memorandum Opinion and Order*, Docket 04-186, Nov. 4, 2008 (http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-08-260A1.doc)

their geographic coordinates prior to their initial service transmission at a given location.”²

§16.712(a)(1) gives the technical criteria for determining whether a TV channel is available at a given location. This rule states that “These contours are based on the R-6602 curves contained in Section 73.699 of this chapter.”

In our *Petition for Reconsideration* in Docket 04-186³ we discussed the implications of using the R-6602 model that was originally developed 1) using limited data, 2) under the assumption that the required computations are to be accomplished by a mechanical desk top calculator at the time, and 3) for the purpose of determining the spacing between co-channel TV stations to avoid area interference. The R-6602 model significantly overprotects TV coverage, thus denying white space access in a lot of areas that otherwise are available for interference-free operation..

The Commission previously found that its

“traditional predictive methodology for determining a Grade B contour (*e.g.* R-6602 based prediction) is inappropriate for predicting signal strength at individual locations. Our rules state that this methodology is for three purposes only: (1) estimation of coverage resulting from the selection of a particular transmitter site, (2) problems of coverage related to 47 C.F.R. § 73.3555 (ownership restrictions), and (3) determination of compliance with § 73.685(a) concerning minimum field strength over the principal community. The traditional methodology predicts signal strength on the basis of average terrain elevation along radial lines extending only ten miles from a television station's transmitter. The traditional methodology does not accurately reflect all the topographic differences in a station's transmission area, and explicitly does not account for interference from other signals. These omissions make it an imperfect methodology for predicting whether an individual household can receive an adequate signal. For example, the model may fail to account for terrain

² 47 C.F.R. 15.711(b)(3)

³ *Petition for Reconsideration* of Adaptrum, Inc, Docket 04-186, March 18, 2009 (<http://fjallfoss.fcc.gov/ecfs/document/view?id=6520202069>) p. 6-9

features that could block a house's reception.”⁴ (References omitted and emphasis added)

II. Docket 10-152 Proposals

The Docket 10-152 *NPRM* states that it is

“proposing to prescribe a point-to-point predictive model for determining the ability of individual locations to receive an over-the-air digital television broadcast signal at the intensity level needed for service through the use of an antenna, as required by the STELA. Our goal in proposing this model is to provide a means for reliably and presumptively determining whether the over-the-air signals of television stations, including low power stations, can be received at individual locations for purposes of establishing the eligibility of individual households to receive the signals of distant television broadcast network stations from their satellite carriers. We believe that the proposed predictive model, which is based on the current model for predicting the intensity of analog television signals at individual locations, will allow such determinations to be made in a timely and cost effective manner for all parties involved, including network TV stations, satellite carriers and satellite subscribers.”⁵

The *2ndR&O* decided “to protect both full service and low power TV services from interference within the protected contours specified in the rules for full service TV stations.”⁶ It did recognize some of the limitations of the R-6602 model stating “We recognize that in some instances viewers receive TV service off-the-air at locations beyond the protected contours specified for full service stations.”⁷ The parallel sensing requirement in the TVBD rules gives significant protection to areas outside the grade B contour with unusually high TV signals especially since the sensing must be a thousand times more sensitive than typical TV receivers.

But the basic physics of the situation as shown in a previous *ex parte* presentation⁸ is that in terrain that is rough the R-6602 model often overstates coverage. For example,

⁴ R&O, Docket 98-201 (February 2, 1999) at para. 67

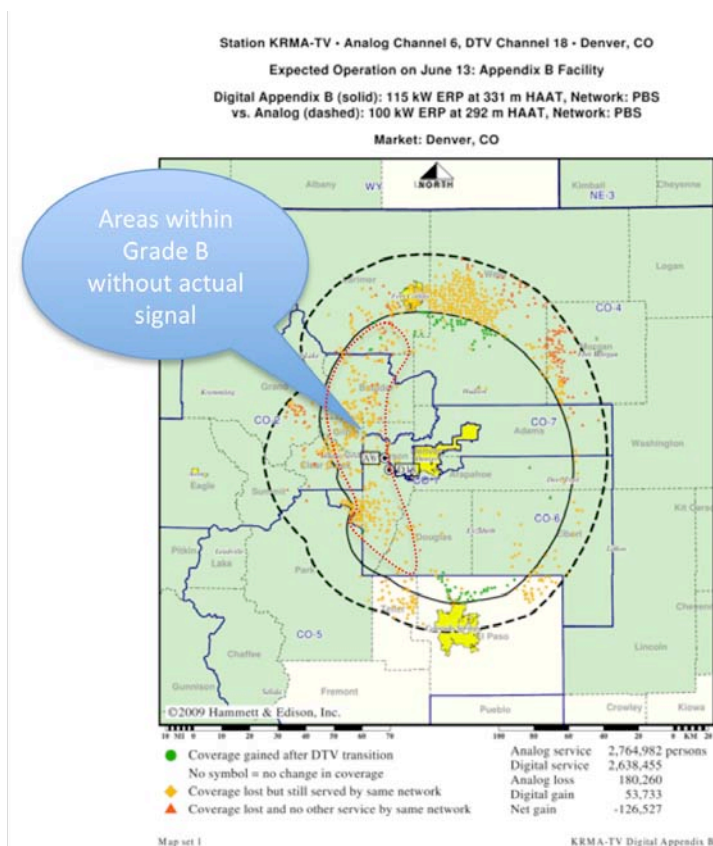
⁵ *NPRM*, Docket 10-152 at para. 2

⁶ *2ndR&O* at para.165

⁷ *ibid.* at para. 166

⁸ Adaptrum *ex parte* Notice, Docket 04-186, March 5, 2010 (<http://fjallfoss.fcc.gov/ecfs/document/view?id=7020394542>)

Figure 1 shows the Grade B contour along with actual service predictions for KRMA-TV from the dtv.gov website:



<http://www.fcc.gov/mb/engineering/maps/images/callsigns/KRMA.gif>

Figure 1: KRMA Service Predictions

The FCC predictions do not show all the areas inside the grade B contour without real DTV service, but they should be the subset of those that had analog service and lost it during the DTV transition. Clearly there are a lot more areas in this rugged terrain without service than the orange dots shown.

We also noted that the Commission's UK counterpart Ofcom is proposing rules similar to TVBD rules using only database sensing. While Ofcom has never precisely identified

its propagation model it appears to be using the coverage models developed by Arqiva – the operator of most TV transmitters in the UK. Figure 2 shows a typical Arqiva coverage map for a UK TV station.

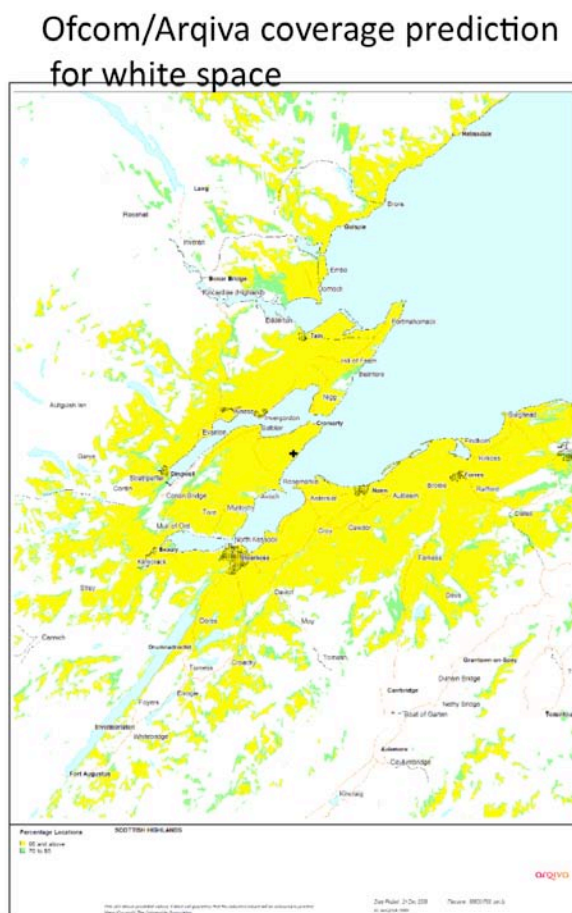


Figure 2: Arqiva UK TV Coverage Map

The Figure 1 grade B contour is smooth because the R-6602 model uses little terrain information – only 10 data points between 10 and 50 km from the transmitter on each radial per 47 C.F.R. 73.699 Figure d. The main variation of the grade B contour in Figure 1 from a circle comes from the horizontal antenna pattern of the transmitter’s antenna, not the very rough terrain in this area.

The Docket 10-152 propagation proposal deals specifically with DTV and proposes to use a propagation model that uses details of terrain that are readily available and practical to use – an option that the developers of R-6602 did not have in the mid-1960s when that model was developed.

III. Monterey CA Example of R-6602 Limitations

Monterey, California is a city of 30,000 that is also the major city in a county of the same name which has a population of 400,000. “As the crow flies” it is 85 miles from San Francisco, but that path is very rugged terrain. Figure 3, below, shows the Commission’s own DTV.gov website data for this city. (The street address used is the City Hall.)

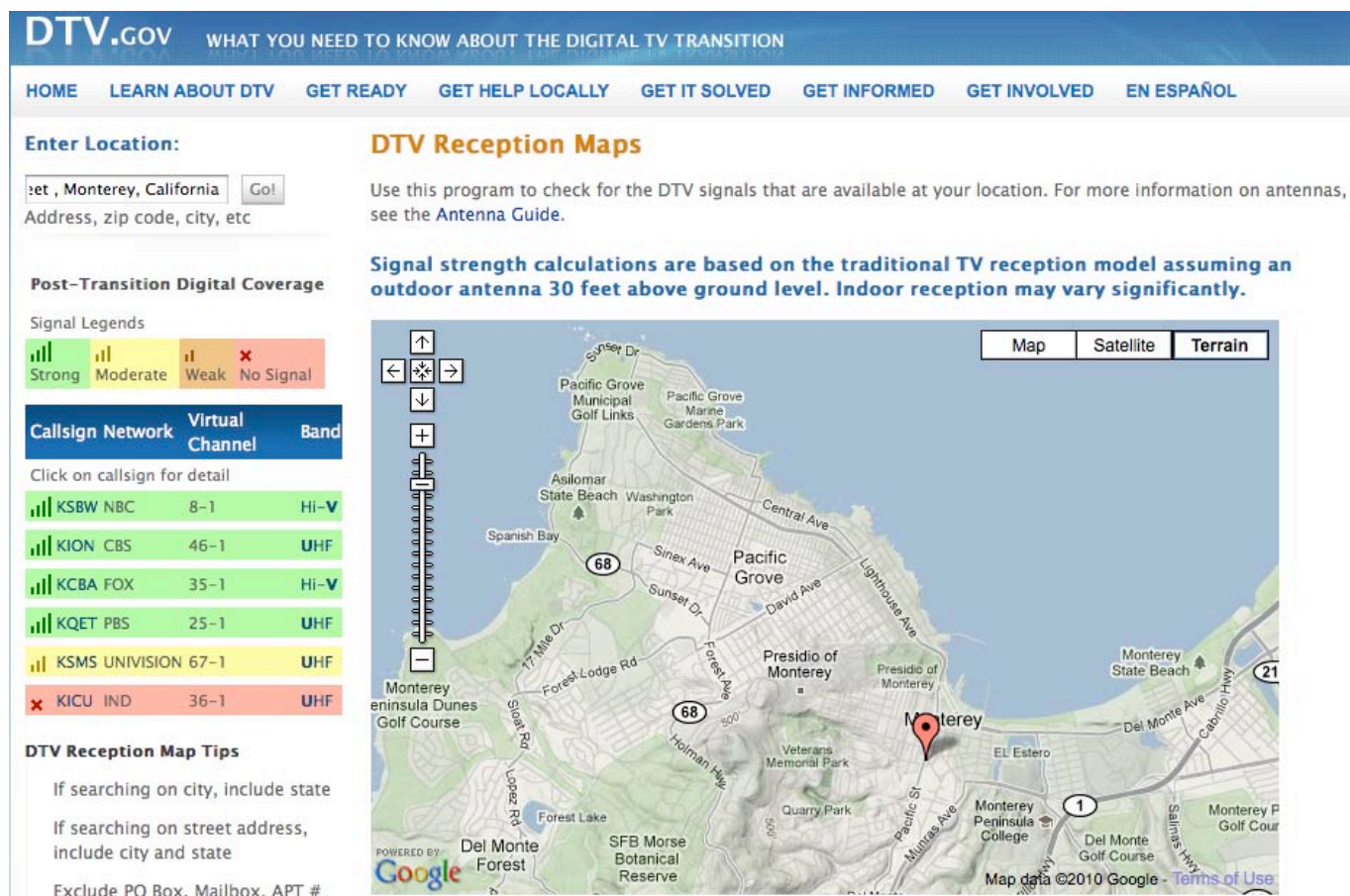


Figure 3: DTV.gov Data for Monterey CA

As can be seen from the Commission's own data using an apparently ILLR-like propagation model viewed in Monterey have few over-the-air viewing options.⁹

Although the Commission has never disclosed technical details of the propagation model used for DTV.gov it clearly takes into account the rugged terrain in the area.

By contrast, under the current TVBD rules using the R-6602 model, almost no UHF White Space channels are available in Monterey, CA, while the DTV.gov website data shows a very different picture: Any TV reception in Monterey with an over-the-air antenna is challenging and one can not even get all 4 major commercial networks!

The basic reason for the discrepancy is the rugged terrain as shown in Figure 5. While R-6602 may give plausible results in flat and moderate terrain, its use in mountainous areas often gives rise to highly inaccurate coverage prediction.

⁹ It is interesting to note that KSMS-TV has Monterey as the "city of license" and presumably meets minimum coverage requirements, but only has "moderate" coverage.

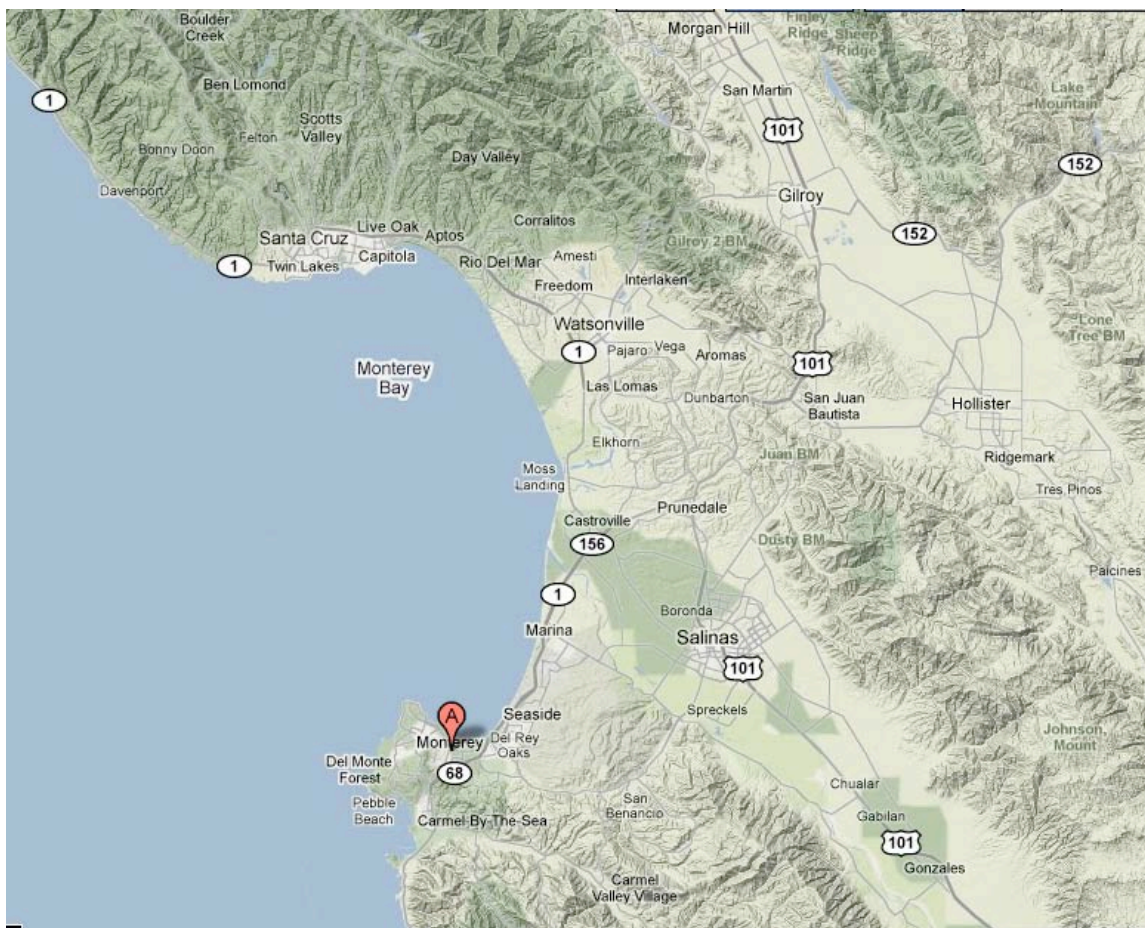


Figure 5: Terrain in Monterey area

IV. Recommendation

Adaptrum suggests that at the conclusion of the Docket 10-152 rulemaking that the new ILLR-based DTV model also be approved in addition to the R-6602 model for optional use in §15.713 coverage predictions. This could be done by amending §15.712 to incorporate both models. While ILLR-based models are more complex from the computational viewpoint, they can be easily handled by today's computers and should be preferred by White Space users and Database Administrators since they give far more accurate predictions. The basic wording of the Docket 10-152 *NPRM* suggests that that

the TV coverage issue in the DBS case is the same as that in the TVBD case and therefore the same ILLR-based model should be available to both the DBS community and the TVBD community for determining whether a specific location actually has TV coverage.

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